

Certificate No:

M-12601

File No:

723.10

Job Id:

262.1-010133-2**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Diesel Engine**

with type designation(s)

D16

Issued to

**AB Volvo Penta
GÖTEBORG, Sweden**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships/High Speed and Light Craft**Application :****The approval is valid for propulsion, auxiliary and emergency duty.****Rating See page 2**This Certificate is valid until **2018-06-30**.Issued at **Høvik** on **2014-06-12**DNV GL local station: **Gothenburg**Approval Engineer: **Jørgen Jensen Tande**for **DNV GL**Digitally Signed By: Nguyen, Tin Huu
Location: DNV GL Høvik, Norway
Signing Date: 2014-06-17 on behalf of**Oddvar Deinboll
Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed. If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million. In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

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Product description

Four stroke diesel engine

Cylinder bore: 144 mm
Piston stroke: 165 mm
No. of cylinders: 6 in-line

Application/Limitation

The approval is valid for propulsion, auxiliary and emergency duty and is based on the following main data:

Propulsion:

| Volvo Rating Group | 1 | 2 |
|--------------------------------|------|------|
| Mean indicated pressure (bar): | 23.2 | 25.4 |
| Max. cylinder pressure (bar): | 165 | 177 |
| Rated power (kW): | 478 | 551 |
| Corresponding to (RPM): | 1800 | 1900 |

Auxiliary/Emergency:

| | | |
|--------------------------------|------|------|
| Mean indicated pressure (bar): | 26.2 | 24.4 |
| Max. cylinder pressure (bar): | 169 | 176 |
| Rated power (kW): | 450 | 500 |
| Corresponding to (RPM): | 1500 | 1800 |

Type Approval documentation

Crankshaft drawing 20463959 and marked drawings in Volvo Penta Document List CL0648

Tests carried out

Type test report 77768-1 dated 2006-03-02.

Marking of product

The product is to be marked with the manufacturer's name or trademark and type number identification.

Periodical assessment

For retention of the Type Approval, a DNV surveyor shall perform a survey every second year and before the expiry date of this certificate to verify that the conditions of the type approval are complied with.

The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval Certificate was issued. The main scope of the Periodical Assessment will normally include:

- Verification of the Type Approval applicant's production and quality system w.r.t. ensuring continued consistent production of the Type Approved products at the Type Approval applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
- Review of the Type Approval documentation and that this is still used as basis for the production
- Review of possible changes to the design, the material and the performance of the product
- Verification of the product marking.

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Other conditions

Foundation arrangement to be submitted for each installation according to the Rules, Pt. 4 Ch.3 Sec.1 A500 – Documentation of arrangement.

Torsional vibration calculations to be submitted for each installation according to the Rules Pt.4, Ch.3, Sec.1, G - Vibration.

Signboards according to the Rules Pt.4, Ch.3, Sec.1, C 406

Flexible hoses with couplings to be type approved by DNV.

The engine control system type EMS is type approved with certificate A-13306

Electric cables and cabling are not covered by this approval and must be verified to comply with the requirement of DNV Rules for Ships/ High, Speed Light Craft and Naval Surface Craft Pt.4 Ch.8 - Electrical Installation.

The approval does not include driven member.

END OF CERTIFICATE